

PATENT SPECIFICATION

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(54) ACARICIDAL COMPOSITIONS

(71) We, ROBERTS LABORATORIES LIMITED, a British Company, of Burnden Road, Bolton, Lancashire, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to acaricidal compositions, and to the use of such compositions in the treatment of bedding and other materials.

House dust allergies take various forms, including principally asthma, but also skin and eye infections. It has been established by numerous authors that house dust allergy in a high proportion of cases is caused by the *dermatophagoides* family of acarine mites and that a beneficial effect can be expected from the eradication of the mites followed by a prevention of their recurrence. It is well known that the various species of mite, the *dermatophagoides* family, species *culinae*, *pteronyssinus*, the house mite *glycyphagus domesticus* and the flour mite *acarus ciro* are relatively non-susceptible to normal insecticides such as pyrethrins and D.D.T. They are, however, known to be highly susceptible to certain acaricides such as benzyl benzoate which is widely used in the treatment of scabies and other such infestations. For this purpose, benzyl benzoate has conventionally been emulsified in water, in which it is insoluble, and the emulsion applied liberally to the patient's skin.

The mites in question live and breed largely in bedding materials, e.g. sheets, mattresses and blankets. It would be useful to treat such bedding materials so as either to kill mites coming in contact with them, or at least to prevent the mites from breeding there. One difficulty in such treatment arises from the fact that benzyl benzoate, though it does not boil until about 320°C, does have an appreciable vapour pressure at ambient temperatures. This vapour pressure is increased at the higher temperature taken up by the bedding when the bed is occupied. As a result, benzyl benzoate only gives temporary protection from mites, since in the course of time it evaporates away and is lost.

It is an object of the present invention to provide compositions containing benzyl benzoate in which its rate of evaporation is retarded.

The present invention provides a composition comprising benzyl benzoate with from 5% to 50%, preferably from 10% to 25% by weight on the weight of the benzyl benzoate, of a non-volatile polyalkylene glycol or a non-volatile ether or ester of a polyalkylene glycol and a method for the prevention and control of acarine organisms in bedding and other materials which comprising applying said composition to said material.

Comparative studies have been carried out on the rate of evaporation of benzyl benzoate, a) alone, and b) in the presence of 20% of its weight of polyethylene glycol 4,000.

Evaporation Tests at 37°C in Moving Air

	Initial	8 days	16 days
benzyl benzoate alone	100%	82.44%	66.98%
benzyl benzoate+20% polyethylene glycol 4,000	100%	93.16%	88.6%

As can be seen from the evaporation rate tests, the concentration of benzyl benzoate remaining in the presence of retarder is very considerably higher than it is without retarder and the retarder will obviously retain benzyl benzoate for a considerable period. The use

of retarder with benzyl benzoate in treating cloth thus has the obvious advantage that the treated cloth will remain active in the patient's bed against dust mites for a reasonable number of months without the necessity for re-treating the bedding at short intervals.

[Price 25p]

The polyalkylene glycol or ether or ester thereof is preferably of sufficiently high molecular weight to be solid having a melting point of above 37°C, non-sticky and non-hygroscopic. As derivatives, there may be mentioned mono- and di-ethers of polyalkylene glycols, and mono- and di-esters of polyalkylene glycols, in which the terminal hydrocarbon groups each contain from 1 to 22 carbon atoms, e.g. polyethylene glycol dimethyl ether, and polyethylene glycol di-stearate. We prefer to use polyethylene glycols having a molecular weight of at least 2,000, although polypropylene glycols or other polyalkylene glycols may be used as alternatives.

Our preferred polyethylene glycols appear to dissolve in benzyl benzoate up to about 20% concentration. Doubtless, when most of the benzyl benzoate has finally evaporated, the remainder is dissolved in the polyethylene glycol and its rate of evaporation substantially lowered. But it is surprising that the rate of evaporation of benzyl benzoate is considerably slowed down right from the start by the presence of relatively small amounts of polyalkylene glycols.

The compositions of this invention may be made up in a suitable form for application. For an aerosol spray, the composition may be dissolved in a volatile solvent, preferably an anhydrous solvent, for example, industrial methylated spirit, and provided with a propellant, for example, dichlorodifluoromethane. The formulation of an aerosol spray may be according to principles well known in the art.

For a solution into which sheets may be dipped, the composition of this invention may be dissolved in a volatile solvent, preferably one that is not excessively inflammable, for example chloroform or carbon tetrachloride. The dipped sheets may be dried in a current of warm air.

While it is possible to disperse the compositions of this invention in aqueous media, this is not preferred, since it requires the use of an emulsifying agent which may remain permanently on the bedding materials treated, and since it is not practicable to apply large quantities of water to mattresses and pillows.

Solutions of the compositions of this invention may be readily and uniformly applied to bedding or other materials by any convenient technique, e.g., spraying or dipping. It may be useful to apply the solution, e.g., by calendering or spraying, during manufacture of the material. Mattresses are generally best treated by spraying, while blankets and sheets may suitably be dipped. Treatment may be effected on any textile material where mites are liable to live or breed.

The rate of application depends very substantially on the nature of the substrate. Sheets treated with from 12.5 g to 25 g per sq. metre of benzyl benzoate have been proved

lethal to the mites. The application of more than 25 g/m² of benzyl benzoate to sheets is unlikely to provide significant added effect. But additions very substantially below 12.5 g/m², e.g. down to 1 g/m² or even less, are likely to provide useful protection. With thicker materials, such as blankets, different rates of application will be suitable, while with mattresses and pillows other rates again will apply. The skilled worker will have no difficulty in determining optimum rates of applications of benzyl benzoate in any particular instance.

The nature of the fabric to be treated is not critical to the invention. The compositions of the invention are effective on any of the commonly used textile materials, e.g. cotton, linen, wool, polyamide and polyester.

It appears that mites are only killed by physical contact with liquid or solid benzyl benzoate, and not by contact with the vapour. It is therefore desirable to effect physical removal of at least the bulk of the mite infestation before applying the compositions of this invention to the bedding. The application of benzyl benzoate to infested bedding is of limited use, particularly as the mites are capable of causing asthma irrespective of whether they are alive or dead.

According to preferred procedure, therefore, after application of the composition of the invention the material is washed to physically remove dead acarine organisms and then subjected to a further application of said composition. The pillow is preferentially changed for a foam or terylene pillow to avoid a concentration of dust mites being inside the feathers of a feather pillow and the mattress and the surrounding areas are thoroughly cleaned with a vacuum cleaner, care being taken particularly with the areas under mattress buttons and down seams. Once this has been done, either the mattress or a piece of sheet which is placed over the mattress is sprayed with the contents of an aerosol can. By way of example, the composition of the contents of the aerosol can may be:—

	parts by weight	
Benzyl benzoate	50	115
Polyethylene glycol 4000	10	
Industrial methylated spirit	10	
Difluoro-dichloro-methane	80	

Clinical tests with the benzyl benzoate treated bedding in the presence of the retarder have shown patient acceptability to be extremely good and the material has proved effective in preventing re-infestation by dust mites.

WHAT WE CLAIM IS:—

1. An acaricidal composition comprising benzyl benzoate with from 5 to 50% by weight

- on the weight of the benzyl benzoate of a non volatile polyalkylene glycol or a non-volatile ether or ester of a polyalkylene glycol.
2. A composition as claimed in claim 1 in which the concentration of said polyalkylene glycol, ether or ester is from 10 to 25% by weight on the weight of the benzyl benzoate.
3. A composition as claimed in claim 1 or claim 2 in which the polyalkylene glycol is a polyethylene glycol having a molecular weight of at least 2000.
4. A composition as claimed in claim 1 or claim 2 in which the polyalkylene glycol ether or ester is one in which each of the terminal hydrocarbon groups has from 1 to 22 carbon atoms.
5. A composition as claimed in any one of the preceding claims which is in the form of an aerosol and which, in addition to the benzyl benzoate and the polyalkylene glycol or ether or ester thereof, further comprises a volatile solvent and a propellant.
6. A composition as claimed in any one of claims 1 to 4 which is in the form of a solution of an non-aqueous volatile solvent.
7. An acaricidal composition according to claim 1 and substantially as hereinbefore described and exemplified.
8. A method for the prevention and control of acarine organisms in bedding and other materials which comprises applying to said material a composition comprising benzyl benzoate with from 5 to 50% by weight on the weight of the benzyl benzoate of a non-volatile polyalkylene glycol or a non-volatile ether or ester of a polyethylene glycol.
9. A method as claimed in claim 8 in which said composition contains from 10 to 25% by weight on the weight of the benzyl benzoate of said glycol, ether or ester.
10. A method according to claim 8 or claim 9 in which the composition is applied in sufficient amounts to provide a concentration of benzyl benzoate of from 1 to 25 gms per square metre of material.
11. A method as claimed in any one of claims 8 to 10 in which after application of the composition the material is washed to physically remove dead acarine organisms and then subjected to a further application of said composition.
12. A method according to claim 8 and substantially as herein described.
13. Bedding and other materials whenever treated by the method claimed in any one of claims 8 to 12.
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